

REPORT ON THE THAI-DUTCH BOTANICAL EXPEDITION 1965/1966

by

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PREFACE

Hitherto, only a few Dutch botanists have collected in Thailand. In 1862 Mr. J.E. TEJSMANN, Curator of the Buitenzorg Botanic Gardens, Java, joined Mr. A. LOUDON during a diplomatic mission to the court of King MONGKUT of Thailand, and became the first Dutch botanist to work in that country. He observed more than 300 plant species (amongst these four pteridophytes) and collected many specimens, living or dried, during a trip to the southwest, visiting Rachaburi, Kanchanaburi and Phetburi. From his collections several new species were described, sometimes from trees grown in the Buitenzorg Botanic Gardens, for example the beautiful ornamental tree *Lagerstroemia loudonii* T. & B. After the Second World War another Dutch party made botanical investigations in Thailand. In 1946 Dr. S. BLOEMBERGEN, Mr. G. DEN HOED, and Dr. A.J.G.H. KOSTERMANS made collections of phanerogams, pteridophytes and bryophytes in the Kwae Noi Basin, after having spent several years in the same region as prisoners of war. A little later, Dr. KOSTERMANS made another study and collecting tour in Thailand and Indo-China. During and after the 9th Pacific Science Congress, Bangkok, Dr. C.G.G.J. VAN STEENIS made a small collection in November 1957. As an instructor of the 4th UNESCO Training Expedition, Dr. H. SLEUMER of the Rijksherbarium visited Thailand in 1963, and collected mainly in limestone areas.

Up till the present, botanists collecting in Thailand mainly concentrated on the study of flowering plants; the so-called 'lower plants' have been neglected during almost every botanical expedition. Especially after the Second World War the devastation of the forest increased considerably, therefore an extension of the data concerning cryptogams is very urgent. In the valleys, large areas that were char-

acterised by more or less undisturbed forest only a decade ago, are now covered by rice-fields. Everywhere along the newly constructed roads in the formerly inaccessible hilly regions of the country new settlements arise. At higher elevation in the hills and mountains the number of forest clearings used in shifting cultivation by the hill tribes is rapidly increasing too. Phytogeographically, Thailand occupies a key position in Southeast Asia, being a contact area between the Malesian, Himalayan and Indo-Chinese floras, and it appears to be of great importance to collect additional, well annotated collections and ecological data.

For these reasons, a botanical expedition to various parts of the country was planned, during which attention should be concentrated on pteridophytes and bryophytes.

This trip could be realised through substantial grants from the Treub Foundation, the Treub Society, and the State University at Leyden. The equipment was furnished by the Rijksherbarium at Leyden, the Forest Herbarium at Bangkok, and the Netherlands Organization for the Advancement of Pure Research.

Through the courtesy of the Director-General of the Royal Forest Department, Mr. DUSIT BANIJBATANA, we were permitted to stay at the Forest Stations in the areas investigated; the local Forest Officers gave us every assistance.

We are most grateful to Mr. TEM SMITINAND, Curator of the Forest Herbarium, who spent much time in organizing the Thai part of the expedition.

The Netherlands Ministry of Foreign Affairs introduced the party to the Thai Government and contributed much to a prompt settlement of her affairs through the Netherlands Embassy at Bangkok.

Participants were A. TOUW, M.Sc. (collecting cryptogams excl. pteridophytes) and E. HENNIPMAN, M.Sc. (collecting pteridophytes and phanerogams) of the Rijksherbarium, and Mr. CHAMLONG PENGKLAI of the Forest Herbarium. Other members were plant collector Mr. KHANTCHAI BOONCHUAY, and Mr. LUAN MUEANPUT,

the capable driver of the Land Rover, who often also joined the party during its collecting trips.

For the identification of the non-pteridophytes mentioned in this paper, we are indebted to Dr. H. SLEUMER (Ericaceae), to Mr. J.H. KERN (Cyperaceae), and to Mr. CHAMLONG PENGKLAI (Gymnosperms). Names of bryophytes have been omitted, as the sorting of these plants was not finished when the present publication was prepared.

ITINERARY (see map on p. 272)

1. Doi Musae and the Langsang Forest Park

November 16th we left Bangkok by Land Rover and reached Tak in the early evening. The greater part of the day we drove through the Chao Phraya Plain, characterized by endless wet rice-fields, and through low hills, covered with deciduous dipterocarp forest. Next morning we left Tak for the Doi Musae Agricultural Experiment Station (c. 780 m), situated about 35 km southwest of Tak along the road to Mae Sod. We used this Station as a base, from which trips were made into the surroundings, mainly in moist evergreen forest along streamlets. Among the terrestrial ferns we found *Cyathea gigantea* (Hook.) Holtt., *Bolbitis heteroclita* (Presl) Ching and several species of the genera *Cyclosorus*, *Tectaria*, *Pyrrosia* and *Pteris*. The forest was rather rich in epiphytes, e.g. *Arthropteris palisotii* (Desv.) Alston and *Trichomanes motleyi* Bosch. The magnificent flowers of *Sapria himalayana* Griff. (Rafflesiaceae) grew on the dark forest floor.

November 18th and 23rd the Langsang Forest Park (between Tak and Doi Musae) was visited. Common ferns in this limestone area were *Drynaria bonii* Christ, *Doryopteris ludens* J.Sm., *Bolbitis appendiculata* (Willd.) Iwats., *Psilotum nudum* (L.) Griseb., and several species of *Adiantum* and *Pyrrosia*. November 21st we collected at the base of Doi Pha Wo, a limestone peak about 50 km west of Doi Musae.

2. Doi Suthep

November 26th we left Doi Musae for Chiangmai. The beautiful Forest Station on Doi Suthep (1050 m) served as a base for all our trips in Northern Thailand,

The mountain west of Chiangmai, which is generally referred to in literature as Doi Suthep, bears three tops, of which Doi Suthep (c. 1050 m) is the lowest one. The higher tops are called Doi Buak Ha (c. 1600 m) and Doi Pui (c. 1685 m). During several days we collected in the evergreen forest and the savannas on these mountains.

3. Doi Chiangdao

The flora of Doi Chiangdao (c. 2200 m), the highest limestone mountain of Thailand, was investigated from December 3rd to 8th. We visited Doi Chiangdao at the beginning of the dry season. During the rainy season it is hardly possible to climb the precipitous slopes of this massive. Since the highest waterhole was situated at 910 m only, water had to be carried daily to our camp sites, at 1100 m and 1425 m.

December 3rd we started the ascent, and collected along the path to camp 1 in dry evergreen forest and deciduous forest rich in bamboo and *Dillenia*. Both appeared to be rather poor in ferns and mosses. The same held true for the vegetation on a ridge near our camp, which was visited in the morning of December 4th. The ridge itself was covered by a rather open vegetation of stunted trees and shrubs, large *Dracaenas* and succulent *Euphorbias*. The leaves of some ferns growing in exposed places on the ridge were already shrivelled or even shed. A striking species of *Selaginella* [*S. tamariscina* (Beauv.) Spring] with inrolled leaves grew in rock crevices together with *Hypodematum crenatum* (Forsk.) Kuhn. On the way back to our camp collections were made in an area of less dry deciduous forest on the north facing slope, rich in *Dryopteris cochleata* (Don) C. Chr. In the afternoon we investigated the flora along the ascent route to camp 2, an area of open hill evergreen forest with a dense ground cover of grasses and herbs. *Cyclosorus cylindothrix* (Ros.) Ching was a common fern in this vegetation. The trunk bases of the trees were mostly devoid of epiphytes, and showed traces of ground fires.

December 5th our second camp was set up at the edge of the dense hill evergreen forest, which covered the higher slopes of the mountain. Collections were made in the surroundings of the camp

site. *Bolbitis sinensis* (Bak.) Iwats., *Leptochilus decurrens* Bl. and several species of *Diplazium* and *Polystichum* were among the terrestrial ferns collected.

The next day we mainly collected in the forest, climbing an exposed ridge. Above 1600 m the forest became more open, with stunted trees covered by bryophytes, and a ground layer of grasses. On the ridge itself (1650-1680 m) the trees were still lower and the epiphytic vegetation consisted mainly of whitish lichens. Everywhere between the sharp edged boulders the brown leaves of *Leucostegia immersa* (Wall.) Presl and *Araiastegia* cf. *pulchra* J.Sm. could be found.

Due to an early start we succeeded in climbing one of the highest peaks (c. 2150 m) in fair weather on December 7th. At first we climbed through hill evergreen forest, in which the pendulous mosses became gradually longer with increasing altitude, ultimately drooping from rocks, stems and branches in 30-60 cm long veils. At c. 1900 m we reached a sharp ridge with low brushwood and groups of often stunted trees. The final phase of the ascent was exciting, not only on account of the tiring climb on the ridge, along the nearly vertical south slope, but also by the many flowering herbs and shrubs, often belonging to temperate genera, e.g. *Clematis*, *Pedicularis*, *Hypericum* and *Sedum*. The vegetation on the summit consisted of low brushwood with scattered low oak trees, with their branches thickly packed with orchids and liverworts. Looking to the north, grassy slopes with scattered palms (*Trachycarpus* sp.) could be seen. Everywhere around, the activities of hill tribes manifested themselves in large lightgreen areas of forest clearings and in extensive grasslands, which in some places even reached the peaks of this limestone massive (see also: SMITINAND 1966). We were back in Ban Tham, the village at the base of Doi Chiangdao, on December 8th.

4. Fang

Subsequently, we made a one day trip to the open forest near the active sulphur springs at Fang on December 9th, which appeared to be very rich in *Platyserium wallichii* Hook. Rocks adjoining a small rapid were covered by the dark green, flower-bearing crusts of a

representative of the *Podostemonaceae*, a family of highly specialized plants, adapted to this extreme habitat.

5. Doi Inthanon

December 13th we left Doi Suthep by Land Rover, starting a ten days visit to the granitic massive of Doi Inthanon, the highest mountain in Thailand (c. 2570 m). In literature, this mountain is generally referred to as Doi Angka, a name unknown to the local people. We drove via Chiangmai and Chomtong to the Mae Klang Waterfall, where the party stayed overnight. The next day we walked upstream along the Mae Hoi River to Sop Aep, a small village of christianized Skaw Karen, at c. 700 m. The vegetation along the trail consisted almost entirely of dry dipterocarp forest, in less dry situations along the river passing into evergreen forest; the first type was poor in cryptogams. December 15th we made a trip in the surroundings of Sop Aep, visiting the large Kong Yong Waterfall. Common epiphytes in the open deciduous forest were *Platyserium wallichii* Hook., *Aglaomorpha coronans* Copel., and *Drynaria rigidula* (Sw.) Bedd.

Our second camp was located at c. 1250 m near the upper end of the large, fertile valley of Pha Mon, inhabited by animist Skaw Karen. The vegetation between Sop Aep and Pha Mon consisted mainly of evergreen forest. A ridge at c. 1150 m was covered by a rather dry type of hill evergreen forest, rich in *Pinus khasya* Royle. A striking fern in the undergrowth was *Brainea insignis* (Hook.) J.Sm., the black trunk of which indicated the frequent burning of the vegetation by the hill tribes.

Since the valley and its surrounding slopes were predominantly cleared by Karen and Meo, we left it early next morning to reach our highest camp, located in a place called Pang Krai See (c. 1750 m) near the edge of luxuriant, moist evergreen forest. After a tiring climb through thickets with bracken [*Pteridium aquilinum* (L.) Kuhn], tall grasses and herbs, we came at c. 1500 m to a small area with very moist evergreen forest, extremely rich in ferns and bryophytes.

Our camp was situated in the cloud zone, and on arrival we found our carriers numb with cold, gathered around their small fires

in the open, wet forest. After a restless night with heavy showers and gusts of wind we started the ascent to the top on December 18th. Within two hours we climbed through evergreen oak forest to the small summit area covered by tall ericaceous forest rich in epiphytes, e.g. *Oleandra wallichii* (Hook.) Presl, several *Vittaria* spp., and a beautiful *Araiostegia* sp. A striking terrestrial fern was *Acrophorus stipellatus* (Wall.) Moore. Just below the summit, a small *Sphagnum* bog was found, where *Denmstaedtia glabra* Moore, and a *Plagiogyria* sp. were growing; the dominant *Sphagnum* species was *S. cuspidatum* C. Muell.

That night we had a pleasant dinner together with the members of a Japanese botanical expedition, organized by the Kyoto University. The next day much time had to be spent on our collections, and only a short trip was made into the immediate surroundings of our camp. December 20th we collected in the oak forest region at about 2300 m, with *Diacalpe aspidioides* Bl. and several spp. of *Polystichum* and *Diplazium* among the common ferns.

December 22nd we were again at the starting-point, the Mae Klang Waterfall.

6. Mae Sarieng—Khun Yuam

From December 26th to 30th we visited an area near the Burmese border, between Mae Sarieng and Khun Yuam, never before visited by botanists. The accessibility of that area is being improved now by the construction of a new road from Mae Sarieng to Mae Hongson. Unfortunately, the low, hilly country was almost entirely covered by dry deciduous and dry evergreen forest, both poor in cryptogams.

December 26th we drove to Mae Sarieng and the next day we investigated the surroundings of a small stream near Mae La Noi, some 30 km to the north. Hoping to find better collecting localities we went to Khun Yuam on December 28th, but as the forest proved to be invariably dry and open, we returned to Doi Suthep on December 30th.

7. Phu Luang

After leaving the valley of Chiangmai on January 4th, we drove southward through an undulating country covered by mixed dipterocarp forest. Most trees had shed their leaves and bamboos had withered yellow. In several places ground fires were noticed, burning the fallen leaves and the aerial parts of herbs. Between Tak and Sukhotai we entered the Central Valley, where the rice harvest was nearly finished. We stayed overnight in Sukhotai, and early next morning we started for the long trip to Loei. About 20 km past Phitsanulok the first limestone hills appeared, mainly covered by low shrubs and bamboos. Some 10 km further on we found ourselves in hilly country again. Everywhere along the newly built road extensive areas were being cultivated; in many places burnt tree stumps indicated the recent destruction of the forest. Just as in the north most trees were leafless except those in narrow valleys and on the highest parts of the hills. About noon we reached Lom Sak, situated in a flat area with neglected rice-fields, overgrown by tall weeds and shrubs. At Lom Sak we left the metalled road, driving in northern direction over a dust road of bad quality. After having passed another area of low hills, Loei was reached in the evening. Next morning we arrived at Ban Na Luang, a small village at the foot of the mountain ridge Phu Luang, some 50 km southwest of Loei. The sandstone plateau on the summit of the mountain (c. 1400 m) gently slopes down to the northwest. The southeast slope ascends steeply from the plain at c. 350 m.

We started the ascent on January 7th. Up to 750 m we climbed through open dipterocarp forest rich in *Lagerstroemia*. The overall aspect of the vegetation was determined by deciduous bamboos. Higher up, this type was replaced by fagaceous forest with many hygrophytes in the undergrowth. Here, many ferns and mosses could be collected, e.g. *Bolbitis virens* (Hook. et Grev.) Schott, *B. contaminans* (Wall.) Ching, *Microsorium pteropus* (Bl.) Ching, and *Asplenium nidus* L.

We settled our first camp at 920 m. The next day we continued the ascent through evergreen forest, locally rich in wild bananas, ultimately reaching the edge of the plateau at 1300 m. On this plateau

the vegetation consisted mainly of grassy swards with scattered pines and small pieces of dry Fagaceous forest. Immediately on arrival, our carriers burnt off the sward surrounding our camp site. January 9th we crossed the plateau, walking in southern direction. A rich flora was found in the narrow, rocky valleys of small rivulets bordered by evergreen forest. From the sward we collected for instance *Gahnia tristis* Nees (Cyperac.), *Rhododendron simsii* Planch (Ericac.), and the epiphytic *Agapetes lobbii* Clarke (Ericac.). *Dacrydium elatum* (Roxb.) Wall. and *Calocedrus* sp. were among the plants collected in the evergreen forest, the latter obviously a new Conifer genus for Thailand.

The next day we descended by another route to our first camp site. Here one more day was devoted to collecting in the vicinity. Back in Ban Na Luang on January 12th, we drove southward to Ban Si Than at the foot of Phu Krading the same day.

8. Phu Krading

January 13th we climbed this table-mountain following the path on its steep southeast slope. One of the beautiful bungalows of the Forest Station situated on the vast *Pinus* savanna (c. 1220 m) served as a base camp. We collected mainly in streambeds and near waterfalls at the northwestern part of this sandstone massive. January 17th we left Phu Krading for Bangkok.

9. Phuket

January 22nd we left Bangkok for Peninsular Thailand. Immediately outside Bangkok the country was dominated by fruit gardens and orchards, interspersed with rice-fields rich in *Borassus* palms. Near Ratburi the characteristic perpendicular slopes of the first limestone hills were seen. They were covered by low, open forest, in which most trees had shed their leaves. Near Hua Hin the percentage of leafless trees in the forest decreased distinctly, and south of Prachuap Khirikan the forest made the impression of being completely evergreen. Between Chumphorn and Kraburi we crossed the Isthmus of Kra, reaching the southern part of the peninsula, phytogeographically belonging to the area covered by Flora Malesiana. That night we stayed at Ranong and the next day we went to the island of Phuket.

The country along the route was mainly covered by secondary vegetation, locally replaced by rubber plantations and rice-fields.

From our base at the Agricultural Experiment Station at Thalang we made collecting trips to several hills on the island, as well as to nearby places on the mainland. On a trip to the mangrove on January 29th, we collected *Acrostichum speciosum* Willd., *Vittaria ensiformis* Sw., and several *Lycopodium* spp. This part of Thailand has no pronounced dry season and its flora differs widely from the rest of the country. We collected a number of species we had not found before. However, the cryptogamic flora appeared to be rather poor.

10. Khao Luang

The highest mountain of the peninsula, Khao Luang (1740 m), was the object of our next trip. We travelled to Nakhorn Srithamarat on January 30th. Here, a schedule was prepared in consultation with the members of the Fifth Thai-Danish Botanical Expedition, who had just returned from the mountain. February 1st we left for Khiriwong, c. 26 km northwest of Nakhorn Srithamarat. It took three hours before we reached that small village near the mountain. The condition of the road appeared to be very bad. However, the hardest job for our Land Rover was the passage of a small river with a high waterlevel; the bridge had been swept away.

With over twenty carriers we left on February 2nd for our first camp at 620 m. Around the village and up to 400 m we walked through banana and *Areca* palm plantations. The steep slope coming next was covered by evergreen forest in which many large trees had been uprooted by a hurricane in 1963. Here *Monogramma paradoxa* (Fée) Bedd. was found epiphytic. On the way back we collected from rocks *M. trichoidea* (Fée) J. Sm. Tree ferns [*Cyathea contaminans* (Hook.) Copel., *C. gigantea* (Hook.) Holtt., *C. latebrosa* (Wall.) Copel., *C. podophylla* (Hook.) Copel.] and large tectarioid ferns [*Arcypteris irregularis* (Presl) Holtt. and *Pleocnemia hemiteliiformis* (Racib.) Holtt.] were growing in the open places.

February 4th we reached our second camp at c. 1000 m. In many places, the trail was blocked by fallen giants of the forest. The

path was very slippery on account of the rainy weather of the previous weeks. Many leeches attacked the feet of both carriers and botanists. At this elevation the forest was rich in specimens of the ferns *Didymochlaena truncatula* (Sw.) J.Sm., *Trichomanes auriculatum* Bl., *Microlepia hookeriana* (Wall.) Presl, and some others.

The next day an excursion was made to the top. Large collections of mosses and ferns, many of which were new for our expedition, were brought down to our camp. The hill evergreen forest between 1400 m and the summit was rich in epiphytic ferns, also occurring in other Malesian montane forests, e.g. *Ctenopteris celebica* (Bl.) Copel., *C. contigua* (Forst.) Holtt., *C. obliquata* (Bl.) Holtt., *C. tenuisecta* (Bl.) J. Sm., *Acrosorus triangularis* (Scort.) Copel., *Nephrolepis acuminata* (Houtt.) Kuhn, several species of *Lycopodium*, and *Hymenophyllum*. Striking plants in the summit area were the ferns *Cheiropleuria bicuspis* (Bl.) Presl and *Dipteris conjugata* Reinw., together with the *Ericaceae* *Rhododendron taiense* Hutch. and *Vaccinium viscidifolium* K. & G. Following another route, we came back at Khiriwong on February 8th.

11. Khao Yai

By way of Nakhorn Srithamarat we left the peninsula on February 9th. After some days devoted to packing collections, reorganisation of gear, and recreation in Bangkok, we drove to the Khao Yai National Park on February 15th. This beautiful forest reserve is situated some 220 km northeast of Bangkok on the hills at the southwestern edge of the Korat plateau. Though the influence of the dry season was noticeable everywhere it was possible to make some good collections, mainly on Khao Kieo (c. 1200 m) and in the forest on Khao Yai (c. 700 m). Two species of *Podostemonaceae* were found growing on rocks in a streambed in the neighbourhood of the Kluay Mai (Orchid) Waterfall.

Sunday 20th we concluded our field work and returned to Bangkok. After some days spent on packing and farewell-visits, we left the land of smiles on February 22nd.

RESULTS

We made more than one thousand collections of pteridophytes, usually comprising duplicates. The material has been preserved mainly by the Schweinfurth-method, using large plastic bags. In consequence, more time could be spent on collecting and the time-consuming drying of the plants could be delayed until our return in Holland. Although it took more than six months before the plants were finally dried, the material stayed in a good condition.

The number of bryophyte collections amounts to approximately four thousand. Bryophytes, together with some lichens and fungi were dried in the field.

The materials will be distributed by the Rijksherbarium. The first two sets will be placed in the Rijksherbarium (L) and the Forest Herbarium, Bangkok (BKF).

LITERATURE

- SMITINAND, Tem : The vegetation of Doi Chiengdao a limestone massive in Chiangmai, North Thailand. Nat. Hist. Bull. Siam Soc. Vol. **21**, 1966, 93-128.

